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2 March 1964

MEMORANDUM FOR: Chairman, Technical Development Committee

THROUGH : Executive Secretary, TDC

SUBJECT : Phase II Development of an Experimental Direct (Virtual)
Image Viewer1. PROBLEM:

To attain a significant gain in projection viewing of high quality, low contrast materials which are forthcoming.

2. FACTS BEARING ON THE PROBLEM:

a. With the current development in rear projection, reader or screening viewers, the development community will have attained the maximum output from this approach.

b. The projection screen is and will continue to be the limiting factor in the rear projection viewer, even with a highly efficient optical system.

c. It is safe to state that the microscope is the only optical instrument which has the capability of extracting maximum information from photography. A high quality microscope has a high frequency Modulation Transfer Function (MTF) which surpasses the 200 l/mm low contrast materials expected from the collection media in the near future.

d. The microscope is very fatiguing when used for any length of time. It cannot perform a rapid or even modest time screening requirement. It inherently has a very small field of view.

e. There is a requirement for a viewer with the same physical viewing characteristics as the conventional rear projection viewer but with as high an MTF as a high quality laboratory microscope.

f. By having an environment for viewing high quality materials comparable to the rear projection viewer, the efficiency of the PI will be higher over longer periods of time. The instrument will be capable of revealing the high frequency, low contrast information and consequently, the PI will be less prone to miss it.

3. DISCUSSION:

a. The logical approach to the visual exploitation problem would be to expand the characteristics of the microscope; making a large microscope with a field lens instead of a screen. The virtual image would be formed directly in the eye instead of on the screen. This would cut out the screen and its deteriorating effects.

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b. [] proposed a feasibility study for which we contracted. It was successfully proven by their approach that a virtual image viewer was feasible. Areas for development were pointed out in order to attain the ultimate in the approach to virtual image viewing. They are now proposing a follow-on, full-blown experimental engineering model for viewing larger areas.

4. CONCLUSIONS:

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a. The Development Staff has a high degree of certainty that the [] approach is correct by virtue of witnessing the experiments resulting from the contracted feasibility study.

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b. It is now necessary to design, develop and construct an engineering model with all elements "tuned" to maximum efficiency for further evaluation.

5. RECOMMENDATIONS:

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It is recommended that an engineering model be built defined by the criteria of the P&DS Development Objective and [] proposal for the amount of [] on an incentive type contract.

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Development Branch, P&DS